General

Title

Acute stroke mortality: percentage of in-hospital deaths per 1,000 discharges with acute stroke as a principal diagnosis for patients ages 18 years and older.

Source(s)

AHRQ QI research version 5.0. Inpatient quality indicator 17 technical specifications: acute stroke mortality rate. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 3 p.

National Quality Forum measure information: acute stroke mortality rate (IQI 17). Washington (DC): National Quality Forum (NQF); 2013 Oct 2. 13 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of in-hospital deaths per 1,000 discharges with acute stroke as a principal diagnosis for patients ages 18 years and older.

The indicator is stratified into three groups by the type of stroke.

Cases are assigned to strata according to a hierarchy based on mortality, with cases being assigned to the stratum with the highest mortality for which the case qualifies. In the case of stroke mortality the current hierarchy is as follows:

Strata hierarchy (listed from highest mortality to lowest mortality):

- Stratum B (Intracerebral hemorrhage)

Stratum A (Subarachnoid hemorrhage)
Stratum C (Ischemic stroke)

This measure summary represents the overall rate. See also the "Basis for Disaggregation" field.

Rationale

In the last decade there has been a lot of momentum in the care of stroke patients including the certification of primary stroke centers by The Joint Commission beginning in 2003 (2011) and others based on the recommendations of the Brain Attack Coalition and proposed Certification of Comprehensive Centers aimed at improving stroke outcome (Alberts et al., 2000; Alberts et al., 2005; Alberts et al., 2011). Besides a reduction in disability and the need for institutional care, access to higher levels of organized stroke care has been shown to be associated with lower mortality independent of stroke severity and other comorbidities (Langhorne et al., 1993; Brainin et al., 2004; Rønning & Guldvog, 1998; Saposnik et al., 2007; Govan et al., 2007).

Processes of care rendered in the first hours after the onset of stroke are especially critical in the survival of patients with subarachnoid or intracranial hemorrhage or severe ischemic stroke (Morgenstern et al., 2010; Meyers et al., 2009; Bederson et al., 2009). Newer national guidelines warn against early medical decisions to limit care after intracerebral hemorrhage (ICH) based on dated nihilistic beliefs about outcomes in severely ill ICH patients–many of who may have favorable outcomes if provided initial aggressive therapy (Morgenstern et al., 2010). Most of the 26 recommended quality performance process measures for comprehensive stroke centers focus on the timing of care delivery (Leifer et al., 2011).

Complex stroke patients at risk for many of the neurological and medical complications such as secondary neurological injury from cerebral edema and increased intracranial pressure, have better outcomes when they are admitted to a neurological intensive care unit (ICU). This is highlighted in a study that examined outcomes in 1038 patients with ICH in 43 ICUs in the U.S., those admitted to a non-neurologic ICU had more than 3 times a higher odds of mortality (OR 3.4; 95% CI 1.7 to 7.6) (Heuschmann et al., 2003). The risk of mortality was greatly decreased when they were admitted to an ICU with a full-time intensivist (OR 0.30; 95% CI 0.2 to 07) (Heuschmann et al., 2003).

Because subarachnoid hemorrhage (SAH) is treatable and even curable at particular stages, management decisions are critical (Bederson et al., 2009; Cross et al., 2003). Important institutional factors for subarachnoid hemorrhage include availability of endovascular services, the volume of SAH patients treated (Cross et al., 2003; Johnston, Selvin, & Gress, 1998; Johnston, 2000), and the type of facility in which the patient is first evaluated (Johnston et al., 2000). Recurrent hemorrhage remains a serious consequence of aneurysmal SAH, with a case fatality rate of 70% for persons who rebleed, and is currently the most treatable cause of poor outcome. This volume relationship is not limited to SAH, but appears important for all stroke type. Hospitals with higher volumes tend to have improved outcomes, particularly stroke mortality, regardless of stroke center designation (Saposnik et al., 2007; Heuschmann et al., 2003).

Providers may adopt the processes of care or structures of care of the best performing providers or consumers may select the best performing providers in order to improve overall outcomes.

Evidence for Rationale

Alberts MJ, Hademenos G, Latchaw RE, Jagoda A, Marler JR, Mayberg MR, Starke RD, Todd HW, Viste KM, Girgus M, Shephard T, Emr M, Shwayder P, Walker MD. Recommendations for the establishment of primary stroke centers. Brain Attack Coalition. JAMA. 2000 Jun 21;283(23):3102-9. PubMed

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Establishment of Primary Stroke Centers: A Summary Statement From the Brain Attack Coalition. Stroke. 2011 Sep;42(9):2651-2665. PubMed

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Johnston SC. Effect of endovascular services and hospital volume on cerebral aneurysm treatment outcomes. Stroke. 2000 Jan;31(1):111-7. PubMed

Langhorne P, Williams BO, Gilchrist W, Howie K. Do stroke units save lives?. Lancet. 1993 Aug 14;342(8868):395-8. PubMed

Leifer D, Bravata DM, Connors JJ, Hinchey JA, Jauch EC, Johnston SC, Latchaw R, Likosky W, Ogilvy C, Qureshi AI, Summers D, Sung GY, Williams LS, Zorowitz R, American Heart Association Special Writing Group of the Stroke Council, Atherosclerotic Peripheral Vascular Disease Working Group, Council on Cardiovascular Surgery and Anesthesia, Council on Cardiovascular Nursing. Metrics for measuring quality of care in comprehensive stroke centers: detailed follow-up to Brain Attack Coalition comprehensive stroke center recommendations: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2011 Mar;42(3):849-77. PubMed

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Association Council on Cardiovascular Radiology and Intervention, Stroke Council, Council on Cardiovascular Surgery and Anesthesia, Interdisciplinary Council on Peripheral Vascular Disease, and Interdisciplinary Council on Quality of Care and Outcomes Research. Circulation. 2009 Apr 28;119(16):2235-49. PubMed

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National Quality Forum measure information: acute stroke mortality rate (IQI 17). Washington (DC): National Quality Forum (NQF); 2013 Oct 2. 13 p.

RÃ¸nning OM, Guldvog B. Stroke units versus general medical wards, I: twelve- and eighteen-month survival: a randomized, controlled trial. Stroke. 1998 Jan;29(1):58-62. PubMed

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The Joint Commission. Facts about primary stroke center certification. Oakbrook Terrace (IL): The Joint Commission; 2011. 2 p.

Primary Health Components

Acute stroke; intracerebral hemorrhage; subarachnoid hemorrhage; ischemic stroke; death

Denominator Description

Discharges, for patients ages 18 years and older, with a principal International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for subarachnoid hemorrhage or a principal ICD-9-CM diagnosis code for intracerebral hemorrhage or a principal ICD-9-CM diagnosis code for ischemic stroke (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

A systematic review of the clinical research literature (e.g., Cochrane Review)

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Approximately 795,000 acute strokes occur each year in the U.S., with a mortality rate of 17% (Lloyd-Jones et al., 2010) and recurrent event rates of 25% (Rosamond et al., 2008). As a single diagnosis, stroke is the fourth leading cause of all death in the U.S. following diseases of the heart, all cancers, and chronic lower respiratory disease, accounting for 1 of every 18 deaths.

Stroke is the second leading cause of all hospital admissions among older patients and the leading reason for neurology-related admissions (Lloyd-Jones et al., 2010; Wolf et al., 1999). From 1999 to 2009, the number of inpatient discharges from short-stay hospitals with stroke as the first-listed diagnosis has remained stable with 961,000 discharges in 1999 and 971,000 discharges in 2009 (National Heart, Lung, and Blood Institute [NHLBI] tabulation, National Hospital Discharge Survey, National Center for Health Statistics [NCHS]) (Lloyd-Jones et al., 2010). Correspondingly, stroke death rates fell by 24% (Mayo et al., 1996) from 1994 to 2004 (Rosamond et al., 2008). This decline suggests that there have been general improvements in the management of patients with acute stroke, decreases in the severity of stroke and/or improved detection or coding of milder stroke cases. Part of the decline in hospital stroke mortality may be due to the shorter length of stay resulting in more out of hospital death.

The greatest risk of mortality for patients with stroke occurs in the first 30 days, with case-fatality rates ranging from 8% to 20% for ischemic stroke (Wilterdink & Easton, 1992; Sacco, Wolf, & Gorelick, 1999) with substantially higher rates for stroke due to subarachnoid (Broderick et al., 1994) or intracerebral hemorrhage (as high as 50%) (Bederson et al., 2009). The immediate cause of death in more than 60% of stroke cases is thought to be related to complications of the stroke itself (Hartmann et al., 2001; Loor et al., 1999). After the first week, cardiac causes, pneumonia, pulmonary embolism, sepsis, and other medical complications account for the majority of the stroke-related mortality. In 2008, approximately 46% of all stroke deaths occurred in the hospital (unpublished NHLBI tabulation of NCHS 2008 Mortality Data Set). The annual U.S. economic burden of stroke is estimated at $20.4 billion for direct and $53.6 billion indirect costs (Lloyd-Jones et al., 2010).

Evidence for Additional Information Supporting Need for the Measure

Bederson JB, Connolly ES Jr, Batjer HH, Dacey RG, Dion JE, Diringer MN, Duldner JE Jr, Harbaugh RE, Patel AB, Rosenwasser RH, American Heart Association. Guidelines for the management of aneurysmal subarachnoid hemorrhage: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke. 2009 Mar;40(3):994-1025. [509 references] PubMed

Broderick JP, Brott TG, Duldner JE, Tomsick T, Leach A. Initial and recurrent bleeding are the major causes of death following subarachnoid hemorrhage. Stroke. 1994 Jul;25(7):1342-7. PubMed

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National Quality Forum measure information: acute stroke mortality rate (IQI 17). Washington (DC): National Quality Forum (NQF); 2013 Oct 2. 13 p.

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Sacco RL, Wolf PA, Gorelick PB. Risk factors and their management for stroke prevention: outlook for 1999 and beyond. Neurology. 1999;53(7 Suppl 4):S15-24. PubMed

Wilterdink JL, Easton JD. Vascular event rates in patients with atherosclerotic cerebrovascular disease. Arch Neurol. 1992 Aug;49(8):857-63. PubMed

Wolf PA, Clagett GP, Easton JD, Goldstein LB, Gorelick PB, Kelly-Hayes M, Sacco RL, Whisnant JP. Preventing ischemic stroke in patients with prior stroke and transient ischemic attack: a statement for healthcare professionals from the Stroke Council of the American Heart Association. Stroke. 1999 Sep;30(9):1991-4. PubMed

Extent of Measure Testing

Reliability Testing

Data/Sample. The State Inpatient Databases (SID) consists of approximately 30 million adult discharges and 4,000 hospitals ("Healthcare Cost and Utilization Project [HCUP] State Inpatient Databases [SID]," 2008).

The reliability testing for this measure based on the 2008 SID reflect a denominator of 473,785 patients in 4,023 facilities.

Analytic Method. The signal to noise ratio is the ratio of the between hospital variance (signal) to the within hospital variance (noise). The formula is signal / (signal + noise). The ratio itself is only a diagnostic for the degree of variance in the risk-adjusted rate systematically associated with the provider. Therefore, what matters is the magnitude of the variance in the "smoothed" rate (that is, the variance in the risk-adjusted rate after the application of the univariate shrinkage estimator based on the signal ratio).

The reliability estimate (0.776) is a weighted average of the reliability estimates across all providers, where the weight is equal to [1 / (signal variance + noise variance) ^2].

Testing Results. What the data demonstrate is systematic variation in the provider level rate of 6.36 to 12.55 per 100 from the 5th to 95th percentile after a signal ratio of 0.776 is applied as the shrinkage estimator (that is, after accounting for variation due to random factors).

Because the reliability estimate (shrinkage estimator) is used in the calculation of the smoothed rate (as a weighted average of the risk-adjusted rate and the reference population rate) there is no reliability "threshold" or "minimum volume." After applying the shrinkage estimator, all providers are on a "level playing field" with respect to reliability (which is a different question than whether all providers have an equal probability of being identified as an outlier). Refer to the original measure documentation for the distribution of reliability estimates.

Validity Testing

Data/Sample. Several articles have evaluated the criterion validity of using administrative data to identify stroke discharges from acute care hospitals in the U.S. by comparing discharge International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes against chart abstraction as the gold standard. Refer to the original measure documentation for additional information.

Analytic Method. Positive predictive value is a measure of criterion validity. Also known as a measure of precision, it is defined here as the proportion of records with a given ICD-9-CM code that when compared with chart abstraction (the gold standard) are found to have the correct coded diagnosis for stroke. Sensitivity is a measure of the proportion of coded records which are correctly identified as such. Specificity is a measure of the proportion of records that are not coded as stroke which are correctly identified as not having a stroke. Sensitivity and specificity are closely related to the concepts of type I and type II errors.

In addition, face validity was systematically assessed using an expert panel process, as described in the original AHRQ Patient Safety Indicator (PSI) Technical Review. The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire.

Testing Results. Key results from the articles mentioned above are as follows:

> For ischemic stroke, in the Tirschwell study (2002), the sensitivity was 86% (95% confidence interval [CI]; 73 to 94), specificity 95% (95% CI; 88 to 98), and positive predictive value 90% (95% CI; 77 to 97) with a kappa agreement score of 0.82. For intracranial hemorrhage, the sensitivity was 82% (95% CI 66 to 92), specificity 93% (95% CI 86 to 97), and positive predictive value 80% (95% CI 64 to 91), with a kappa score of 0.74. For subarachnoid hemorrhage, the sensitivity was 98% (95% CI 90 to 100), specificity 92% (95% CI 84 to 96), and positive predictive value was 86% (95% CI 75 to 94) with a kappa score of 0.87.
> Piriyawat et al. (2002) reported a sensitivity of 89% for all stroke events.
> When the diagnosis was limited to the primary diagnosis, the Roumie et al. (2008) results were statistically similar in most cases. For ischemic stroke the sensitivity was 74% (95% CI 60 to 85), specificity 95% (95% CI 88 to 98), and positive predictive value 88% (95% CI 74 to 96) with a kappa score of 0.72. When restricting the primary diagnoses to those for intracranial hemorrhage, the sensitivity was 85% (95% CI 9 to 94), specificity 96% (95% CI 91 to 99), and positive predictive value 89% (95% CI 75 to 97) with a kappa score of 0.82. For subarachnoid hemorrhage, the sensitivity was 90% (79 to 97), specificity 97% (91 to 99), and positive predictive value 94% (95% CI 83 to 99) with a kappa score of 0.88.
> For validation of primary ICD-9-CM codes for ischemic stroke, Goldstein (2008) reported a sensitivity of 81% and specificity of 90%.
> Wahl et al. (2010) reported a positive predictive value of 87% (95% CI 82 to 92).

In regards to the expert panels, they gave the indicator a mean rating of 6.1 (SD 2.0) on a scale of 1 to 10 for overall usefulness for quality improvement within a hospital. The median score was 6.5. For comparative reporting, the mean score was 4.8 (SD 2.) and median 5.

Refer to the original measure documentation for additional measure testing information.

Evidence for Extent of Measure Testing

Goldstein LB. Accuracy of ICD-9-CM coding for the identification of patients with acute ischemic stroke: effect of modifier codes. Stroke. 1998 Aug;29(8):1602-4. PubMed

Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). Rockville (MD): Agency for Health Research and Quality (AHRQ); 2008.

National Quality Forum measure information: acute stroke mortality rate (IQI 17). Washington (DC): National Quality Forum (NQF); 2013 Oct 2. 13 p.

Piriyawat P, SmajsovÃi M, Smith MA, Pallegar S, AlWabil A, Garcia NM, Risser JM, MoyÃ© LA, Morgenstern LB. Comparison of active and passive surveillance for cerebrovascular disease: The Brain Attack Surveillance in Corpus Christi (BASIC) Project. Am J Epidemiol. 2002 Dec 1;156(11):1062-9. PubMed

Roumie CL, Mitchel EF, Kaltenbach L, Arbogast PG, Gideon P, Griffin MR. Nonaspirin NSAIDs, cyclooxygenase 2 inhibitors, and the risk for stroke. Stroke. 2008 Jul;39(7):2037-45. PubMed

Tirschwell DL, Longstreth WT. Validating administrative data in stroke research. Stroke. 2002 Oct;33(10):2465-70. PubMed

Wahl PM, Rodgers K, Schneeweiss S, Gage BF, Butler J, Wilmer C, Nash M, Esper G, Gitlin N, Osborn N, Short LJ, Bohn RL. Validation of claims-based diagnostic and procedure codes for cardiovascular and gastrointestinal serious adverse events in a commercially-insured population. Pharmacoepidemiol Drug Saf. 2010 Jun;19(6):596-603. PubMed

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 18 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Making Care Safer
Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

Time window may be determined by the user, but is generally a calendar year.

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
Discharges, for patients ages 18 years and older, with a principal International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for subarachnoid hemorrhage or a principal ICD-9-CM diagnosis code for intracerebral hemorrhage or a principal ICD-9-CM diagnosis code for ischemic stroke

Note: Refer to the original measure documentation for ICD-9-CM codes.

Exclusions
Exclude cases:

- Transferring to another short-term hospital (DISP=2)
- Major Diagnostic Categories (MDC) 14 (pregnancy, childbirth, and puerperium)
- With missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator

Exclusions
Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Death

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Measure is disaggregated into categories based on different definitions of the denominator and/or numerator

Basis for Disaggregation

The indicator is stratified into three groups by the type of stroke.

Cases are assigned to strata according to a hierarchy based on mortality, with cases being assigned to the stratum with the highest mortality for which the case qualifies. In the case of stroke mortality the current hierarchy is as follows:

Strata hierarchy (listed from highest mortality to lowest mortality):

Stratum B (Intracerebral hemorrhage)
Stratum A (Subarachnoid hemorrhage)
Stratum C (Ischemic stroke)

Numerator

Stratum A (Subarachnoid hemorrhage): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Stratum B (Intracerebral hemorrhage): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Stratum C (Ischemic stroke): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.

Denominator

Stratum A (Subarachnoid hemorrhage): Discharges, for patients ages 18 years and older, with a principal International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for subarachnoid hemorrhage.
Stratum B (Intracerebral hemorrhage): Discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for intracerebral hemorrhage stroke.
Stratum C (Ischemic stroke): Discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for ischemic stroke.

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

The predicted value for each case is computed using a hierarchical model (logistic regression using Generalized Estimating Equations [GEE] to account for clustering of patients within hospitals) and covariates for gender, age (in 5-year age groups pooled), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG Risk of Mortality subclass, Major Diagnostic Categories (MDC) and availability of Point of Origin (UB-04). The reference population used in the regression is the universe of discharges for states that participate in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Data (SID) for the years 2008, a database consisting of 42 states and approximately 30 million adult discharges.

Refer to the original measure documentation for additional information.

Standard of Comparison

not defined yet

Identifying Information

Original Title

IQI 17: acute stroke mortality rate.

Measure Collection Name

Agency for Healthcare Research and Quality (AHRQ) Quality Indicators

Measure Set Name

Inpatient Quality Indicators

Submitter

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Developer

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Funding Source(s)

Agency for Healthcare Research and Quality (AHRQ)

Composition of the Group that Developed the Measure

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicator (QI) measures are developed by a team of clinical and measurement experts in collaboration with AHRQ. The AHRQ QIs are continually updated as a result of new research evidence and validation efforts, user feedback, guidance from the National Quality Forum (NQF), and general advances in the science of quality measurement.

Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2015 Jan 5

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Mar

Measure Maintenance

Measure is reviewed and updated on a yearly basis

Date of Next Anticipated Revision

Spring 2016 (version 6.0, including International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10-CM] and International Classification of Diseases, Tenth Revision, Procedure Coding System [ICD-10-PCS] compatible software)

Measure Status

This is the current release of the measure.

This measure updates a previous version: AHRQ QI. Inpatient quality indicators #17: technical specifications. Acute stroke mortality rate [version 4.4]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2012 Mar. 1 p.

Measure Availability

Source available from the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QI) Web site .

For more information, contact the AHRQ QI Support Team at E-mail: QIsupport@ahrq.hhs.gov; Phone: 301-427-1949.

Companion Documents

The following are available:

AHRQ quality indicators. Inpatient quality indicators (IQI) parameter estimates [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 42 p. This document is available from the AHRQ Quality Indicators Web site .

AHRQ quality indicators. Inpatient quality indicators benchmark data tables [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 22 p. This document is available from the AHRQ Quality Indicators Web site .

AHRQ quality indicators. Inpatient quality indicators composite measure workgroup. Final report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar. various p. This document is available from the AHRQ Quality Indicators Web site .

HCUPnet: a tool for identifying, tracking, and analyzing national hospital statistics. [Web site]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); [accessed 2015 Sep 10]. HCUPnet is available from the AHRQ Web site .

NQMC Status

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